08-617,682

CT/GB 94/02101

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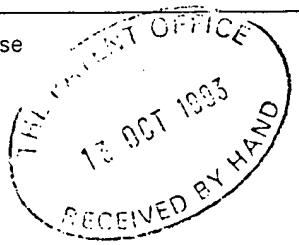

13 OCT 1993

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Your reference N 630 7 IRH

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Rule 16 of the Patents Rules 1990 is the main rule governing the completion and filing of this form.

The Patent Office — Request for grant of a Patent

Form 1/77

Patents Act 1977

❶ Title of invention

1 Please give the title of the invention: DATA ENTRY SYSTEMS

❷ Applicant's details

❷ Do not give trading styles, for example, 'Trading as XYZ company', nationality or former names, for example, 'formerly (known as) ABC Ltd' as these are not required.

☐ **First or only applicant**

2a If you are applying as a corporate body please give:

Corporate name: DATAQUILL LTd

FM 1/77 18.10.93.

Country *(and State of incorporation, if appropriate)*: BRITISH VIRGIN ISLANDS

2b If you are applying as an individual or one of a partnership please give in full:

Surname

Forenames

2c **In all cases**, please give the following details:

Address: PO BOX 3151
SKELTON BUILDINGS
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TORTOLA

UK postcode *(if applicable)*

Country: BRITISH VIRGIN ISLANDS

ADP number *(if known)*: 6431894001 P.A.

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3a Have you appointed an agent to deal with your application?

Yes [X] No [ ] ➡ ***go to 3b***

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Agent's name D. YOUNG & CO.

Agent's address 21 NEW FETTER LANE, LONDON

Postcode EC4A 1DA

Agent's ADP number 59006

3b: If you have appointed an agent, all correspondence concerning your application will be sent to the agent's United Kingdom address.

3b If you have not appointed an agent please give a name and address in the United Kingdom to which all correspondence will be sent:

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❼ Inventorship

7 Are you (the applicant or applicants) the sole inventor or the joint inventors?

Please mark correct box

Yes ☐ No ☒ ➡ ***A Statement of Inventorship on Patents Form 7/77 will need to be filed (see Rule 15).***

❽ *Please supply duplicates of claim(s), abstract, description and drawing(s).*

❽ Checklist

8a Please fill in the number of sheets for each of the following types of document contained in this application.

Continuation sheets for this Patents Form 1/77	0		
Claim(s)	4	Description	20
Abstract	1	Drawing(s)	8

8b Which of the following documents also accompanies the application?

Please mark correct box(es)

Priority documents *(please state how many)*	NONE
Translation(s) of Priority documents *(please state how many)*	NONE
Patents Form 7/77 – Statement of Inventorship and Right to Grant *(please state how many)*	NONE
Patents Form 9/77 – Preliminary Examination/Search	NO
Patents Form 10/77 – Request for Substantive Examination	NO

❾ *You or your appointed agent (see Rule 90 of the Patents Rules 1990) must sign this request.*

❾ Request

I/We request the grant of a patent on the basis of this application.

BY D. YOUNG & CO., AGENTS FOR THE APPLICANT(S)

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❹ Reference number

4 Agent's or applicant's reference number *(if applicable)* N 630 7 IRH

❺ Claiming an earlier application date

5 Are you claiming that this application be treated as having been filed on the date of filing of an earlier application?

Please mark correct box

Yes ☐ No ☒ ➡ ***go to 6***

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❑ number of earlier application or patent number

❑ filing date

(day month year)

❑ and the Section of the Patents Act 1977 under which you are claiming:

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15(4) (Divisional) ☐ 8(3) ☐ 12(6) ☐ 37(4) ☐

❻ Declaration of priority

❻ If you are declaring priority from a PCT Application please enter 'PCT' as the country and enter the country code (for example, GB) as part of the application number.

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6 If you are declaring priority from previous application(s), please give:

Country of filing	Priority application number *(if known)*	Filing date *(day, month, year)*

DATA ENTRY SYSTEMS

This invention relates to data entry systems, to applications of such data entry systems and to equipment for use therewith.

UK patent GB-B-2,202,664 describes an example of an application for a data entry system for the automated ordering of merchandisable items. Merchandisable items are represented in a printed catalogue or other form of list and are associated with bar codes. A merchandise ordering unit comprises a bar code reader with a telephone transmission capability for use in selecting one or more items from the catalogue and transmitting electronically an order for the merchandise to a processing centre over the public telephone network. The orders for the merchandisable items received in this way are processed in the processing centre. As described, the hand held data entry terminal comprises a calculator-like processing unit with a pen-like bar code reader wand electrically connected to the processing unit via a flexible cable. The processing unit includes a display for displaying information and a telephone transmission capability for transmitting captured data via the telephone network. Although this system works well, it is rather bulky and can be somewhat inconvenient in use as it requires two handed operation, one hand for the processing unit and one hand for the wand. Alternatively, if the processing unit is not carried all the time, it needs to be located in a position where the display on the processing unit can be seen and the keys on the processing unit can be operated. It will be appreciated that particularly where the processing unit is being carried in the hand, operation of the keys on it while holding the wand requires considerable dexterity.

European patent application EP-A-0,094,571 describes a self-contained portable data entry terminal positioned within a portable wand-type enclosure. The wand contains a bar code optical reader, signal conditioning electronics, a microprocessor, a memory and a rechargeable battery. The optical reader is operable as a transmitter/receiver so that readout of data stored in the memory is possible. An example of the use of the portable data terminal is described in which captured bar code data can be output from the memory via the optical reader to an optical receiver and from there via an

audio coupler to a telephone line for transmission to a remote station. Another example is described where the bar code data relates to items on a menu in a restaurant. Captured menu selections can be output from the memory via the optical reader to an optical receiver and from there via a computer to a printer in a kitchen. Also described is the programming of the portable data entry terminal using an optical transmitter to input data via the optical reader. The wand includes a beeper for indicating the correct reading of a bar code and the current memory loading. The wand described in EP-A-0,094,571 is relatively simple in construction, and although is it readily portable, it does not provide any confirmation of what has been read.

A further portable data entry terminal manufactured by Telxon Corporation is described in an article entitled "Telxon Corporation, Portable Data Collection and Entry Systems" published by McGraw-Hill in 1989 and referenced "R51-832-101 SKU/UPC Marking and Reading Equipment". The article describes various models of data entry terminals similar to that described in UK patent GB-B-2,202,664. Data from the terminals can be transmitted to a remote station via various telecommunication options including direct connect modems and acoustic couplers. The data entry terminals have a generally rectangular format, similar to a large scientific calculator, with a rectangular display and an array of keys. For most models, a separate bar code reader wand is provided which is connected to the data entry terminal via a flexible cable, requiring a two-handed operation as described above. One model PTC-620 has the same basic format as the other terminals, but is described as being for simple applications and features a snap-on reversible head for one-handed operation with either the left or the right hand. However, this terminal is still relatively bulky and cumbersome and in use it is easy inadvertently to operate one or more keys in the array of keys.

An object of the present invention is to provide a data entry system which mitigates the problems of the prior art.

In accordance with a first aspect of the invention, there is provided a data entry system comprising an elongate hand held data entry unit for capturing data, wherein said hand held unit is configured such that it may be held by a user in the manner of a pen or quill and wherein said hand held unit comprises:

a reading head at or adjacent one end of said hand held unit, said reading head comprising a reading sensor for sensing commands for controlling said hand held unit and data to be entered, said sensor producing input signals in response to said sensed commands and data;

processing means connected to receive and process said input signals from said sensor for decoding and responding to said commands and for generating captured data;

storage means receiving said captured data from said processing means for storing said captured data; and

a display screen for displaying said commands and/or data including a user-readable representation thereof.

The provision of a hand held unit which can be held in the manner of a pen or quill with integral sensor, processing, storage and display means, enables the unit to be used one-handedly in a self-contained manner for the capture, processing, storage and display of data to be captured. In particular, the inclusion of the display in the hand held unit enables the user to verify the data being captured without taking his or her eyes off the areas in which data capture is taking place. The configuration of the hand held unit such that it may be held in the manner of a pen or quill means that the unit can be held in a familiar and comfortable manner. Also, it facilitates the provision of user input means (e.g. switches) on the hand held unit to be located such that inadvertent operation thereof can easily be avoided. By arranging that the reading sensor is also used for the input of commands for controlling the hand held unit, the number of user input means can be kept to a minimum, further reducing the possibility of inadvertent operation.

Preferably, there are provided one or two manually operable switches for scrolling said display in a first and/or second direction for selectively displaying a plurality of data stored in said storage. The scrolling of the display enables a large number of items to be accessed with a relatively compact display. In a preferred embodiment of the invention, said first and/or second switches are the only switches on said hand held unit. Preferably also, operation of said first and/or second switches in predetermined operational states of the hand held unit causes predetermined functions other than scrolling functions to be performed (e.g., powering-up or powering-down of the

hand held unit). By the provision of only two keys on the hand held unit, the possibility of accidentally operating an incorrect key can be reduced, and also the hand held unit can be kept particularly compact.

In accordance with another aspect of the invention, there is provided a data entry system comprising a hand held data entry unit for capturing data, wherein said hand held unit comprises a reading head including a reading sensor for producing input signals, processing means connected to receive and process said input signals, storage means for said processed input signals and a display screen for displaying said processed signals or a representation thereof and wherein said display comprises a touch sensitive screen, said processing means being arranged to display a menu of user selectable items and to be responsive to a location at which said screen is touched for input of a user selection of a said menu item. This increases the possibilities for entering commands and/or data into the hand held unit without the need for additional keys.

Preferably, the hand held unit comprises a sensor for reading coded data, said processing circuitry being arranged to determine natural language characters corresponding to said coded data as said captured data for storage and/or display. The invention finds particular, but not exclusive application to the reading of bar codes and/or binary dot codes, whereby said sensor is a bar code and/or dot code reader. It will be appreciated that the invention also applies to other forms of codes.

In accordance with yet a further aspect of the invention, there is provided a data entry system comprising a hand held data entry unit for capturing data, wherein said hand held unit comprises a reading head including a reading sensor for producing input signals and processing means connected to receive and process said input signals, wherein said reading sensor traces movements of said reading head and wherein said processing means is responsive to signals from said sensor representative of said movements for identifying characters traced by said reading head as captured data. In this manner data entry can be made in an advantageous manner by tracing out the characters of the data to be input or characters representing commands for controlling the operation of the data entry system.

Preferably, said processing means is user programmable to cause

said captured data to be displayed on said display either in a first orientation suitable for reading displayed data when said hand held unit is held in a user's right hand, or in a second orientation suitable for reading displayed data when said hand held unit is held in a user's left hand. In a preferred embodiment the display has a substantially rectangular display screen with a longitudinal axis arranged substantially parallel to a longitudinal axis of the hand held unit. For example, for right handed operation, a string of characters could, for example, be displayed along the display from an end nearest to the sensor to the end furthest therefrom, whereas for left handed operation, the same string of characters would be displayed from the end of the display furthest from the sensor to the end nearest thereto.

One example of a data entry system according to the invention comprises, in said hand held unit, a telecommunications interface which includes a modem unit connected to said storage for receiving said captured data and means for connecting said modem to a remote processing centre, whereby said modem is operable in use to receive said captured data from said storage for telephonic transmission of said captured data to said processing centre. This means that said hand held unit can be connected to a telephone line via a standard telephone socket, either directly, or via a connecting cable, or possibly by some form of radio or other wireless connection.

Alternatively, said data entry system may be provided with a base unit separate from said hand held unit. In this case, said base unit and said hand held unit are preferably provided with a wireless data link which is operable for transferring data from said hand held unit to said base unit and/or from said base unit to said hand held unit. In such an arrangement said base unit preferably comprises a telecommunications interface which includes a modem connectable to said storage via said data link for receiving said captured data and means for connecting said modem to a remote processing centre, whereby said modem is operable in use to receive said captured data from said storage via said data link for telephonic transmission of said captured data to said processing centre.

Said base unit is preferably configured to define a rest position for said hand held unit and said base unit and said hand held unit are preferably provided with a data link which is operable for transferring

data from said hand held unit to said base unit and/or from said base unit to said hand held unit. Preferably, said base unit and said hand held unit are each provided with optical transmitters and/or receivers which cooperate when said hand held unit is in said rest position to provide a two way optical data link for transferring data from said hand held unit to said base unit and/or from said base unit to said hand held unit. This arrangement means that the hand held unit may be taken from the base unit to perform data entry functions and then returned to the rest position on the base unit for the transfer of data stored in the hand held unit. The use of an optical link avoids the need for external data communication contacts.

Preferably, said hand held unit comprises a rechargeable power source, said base unit comprises a charger unit and said base unit and said hand held unit are each provided with electrical connectors which can be interconnected to enable recharging of said rechargeable power source. This arrangement provides a practical solution to the provision of a power supply for the portable hand held unit.

A data entry system comprising a hand held unit with or without a base unit as described above, can also include means for displaying a plurality of selectable items with associated data sources for user selection of an item by operation of said hand held unit and a remote processing centre for processing user selections transmitted from said hand held unit. For a data entry system of this type, said hand held unit preferably comprises means for inputting programming commands, said processing circuitry is arranged to respond to said programming commands to issue coded instructions via said telecommunications interface to said data processing centre and for receiving via said telecommunications interface for programming said hand held unit programming data sent from said programming centre in response to said coded instructions.

Accordingly, the invention also provides a data entry system additionally comprising means for displaying a plurality of selectable items with associated data sources for user selection of an item by operation of said hand held unit and a remote processing centre for processing user selections transmitted from said hand held unit. Preferably, said hand held unit is programmable remotely from said processing centre.

The invention also provides a merchandising system comprising a data entry system of this type wherein said selectable items are merchandisable items and said remote processing centre initiates processing of user orders of said selectable merchandisable items.

A data entry system or a merchandising system as described above preferably includes a verification device in the form of a verification card (e.g., a credit, payment or other validation card) or like carrier carrying a verification bar code and/or dot code for verification of a user identity. Operation of the data entry system subsequent to an initial data capture operation can then be made dependent on the identification of authorised coded data.

The invention also provides a card or like carrier carrying a verification bar code and/or dot code suitable for verification of an identity of a user of a data entry system or merchandising system as defined above.

The invention also provides a carrier for a plurality of data and/or command codes (e.g., bar and/or dot codes) for association with means for displaying a plurality of selectable items in a data entry system or a merchandising system as defined above, wherein said carrier carries a plurality of codes, each for a respective one of a plurality of natural language and/or numeric characters, and a plurality of commands for controlling the operation of the data entry or merchandising system, each code being associated with a visual representation of the corresponding natural language or numeric character or command. This avoids the need for a complete coded data source to be associated with each selectable item in, for example, a catalogue, rather a composite code can be built up by capturing a desired sequence of individual codes. By including the command characters as well, the need for a lot of keys on the data entry device can be avoided.

The carrier is preferably in the form of a sheet of material. The various characters and commands could be arranged in the manner of a standard typewriter keyboard layout to facilitate entry of individual codes to make up a desired code sequence (e.g., for a specific product code).

Exemplary embodiments of the invention will be described hereinafter, by way of example only, with reference to the accompanying

drawings in which like reference numerals are used for like features and in which:

Figures 1A and 1B are schematic views of a substantially pen-shaped hand held data entry device.

Figure 2 is a schematic plan view of a base unit for use with the hand held unit of Figures 1A and 1B;

Figure 3 is a schematic block diagram of the functional elements of a first example of a hand held data entry device as shown in Figures 1A and 1B;

Figure 4 is a schematic block diagram of the functional elements of a base unit as shown in Figure 2 for use with the hand held data entry device of Figures 1A, 1B and 3;

Figure 5 is an overview of a merchandising system using a data entry terminal such as is illustrated in the preceding Figures;

Figure 6 represents a control card with bar codes for a number of numeric and control characters;

Figure 7 is flow diagram illustrating an example of the operation of a data entry system as described with reference to Figures 1 to 6;

Figure 8 is a schematic block diagram of the functional elements of a second example of a hand held data entry device as shown in Figures 1A and 1B;

Figure 9 is a schematic block diagram of the functional elements of a further hand held data entry device which is intended for use without a base unit.

Figures 1A and 1B are schematic views from above and below, respectively, of an embodiment of a substantially pen-shaped hand held data entry unit 10, which will hereinafter, for reasons of conciseness only, be referred to as the "pen 10". The pen 10 is intended to be held for essentially one handed operation between the thumb and forefinger of either the left or right hand in the manner of conventional, if rather thicker than usual, pen.

The pen 10 has a elongate body 12 with, in the present example, external dimensions of approximately 120mm by 40mm. A replaceable red or infra-red optical reading head 14 suitable for reading bar codes is located at one end of the pen and a removable battery cover 16 covering a battery compartment is located at the other end. The reading head is arranged to read with a reading angle of between 0° to 45° to the normal

to the bar code to be read.

On the upper surface of the pen shown in Figure 1A a display screen 20, first and second microswitches 22 and 24, a first indicator light 26 and a second indicator light 28 are located. The display screen 20 preferably comprises a conventional two-dimensional array of pixels which can be selectively activated in order to provide the display of a wide range of displayable items. However, in a low cost version of the pen 10, the display may be configured only to display a predetermined range of characters and symbols, this reducing the complexity of the display and the controlling logic and thus reducing the cost as will be well understood by one skilled in the art.

Any suitable display technology can be used which enables the displayed information to be read over a wide enough angular range such that it can be read by the user when the pen is held at an angle suitable for reading a bar code. In this way it is not necessary to change the orientation of the pen in order to read the display. In view of the low power consumption and advantageous readability characteristics, a 2 line by 16 character supertwist LCD display screen is employed in the preferred embodiment giving a viewing area of approximately 60mm by 16mm with a character size of approximately 3mm by 5.5mm. The display is preferably located towards the end of the pen 10 opposite to the reading head 14 with its longitudinal axis substantially parallel to the longitudinal axis of the pen 10.

With the pen 10 held between thumb and forefinger with the user's hand below the pen as viewed in Figure 1A, and with the pen held at an angle of, say, 30° to the normal of a bar code to be read, (assuming that the normal to the bar code is generally in the direction of the line of sight of the user), the display screen can be read without difficulty.

The switches 22 and 24 are used to control basic operations of the data entry system and for control of the sequential display of stored information (scrolling of the display) as will be explained later. The indicator light 26 is used to report successful scanning of a bar code. The indicator light 28 is used when rechargeable batteries (70, Figure 3) are inserted in the battery compartment to indicate that the batteries are charging.

On the lower surface of the pen 10 shown in Figure 1B, an optical

transmitter 32 and an optical receiver 34 are provided in a shallow recess 33. Also, provided on the lower surface are a locating groove 36 and first and second electrical contacts 30 and 31. The optical transmitter 32 and the optical receiver 34 are used in combination with an optical receiver 62 and optical transmitter 64, respectively, on a base unit 40 to be described with reference to Figure 2, for the transfer of data between the pen 10 and the base unit 40. The locating groove 36 is used correctly to position the pen 10 with respect to a corresponding ridge in a cradle 56 on the base unit 40 when the pen 10 is placed in that cradle 56. The cradle 56 defines a rest position for the pen 10 on the base unit 40. The first and second contacts 30 and 31 are arranged to cooperate with corresponding contacts 60 and 61 in the cradle 56 on the base unit 40 for charging the rechargeable batteries.

Turning now to Figure 2, this illustrates a plan view of a base unit 40 for use with the pen 10 of Figures 1A and 1B.

The base unit includes a generally rectangular housing 42 with a raised portion 44 containing a power supply unit (102, Figure 4) which receives electrical power via a mains supply cable 45 and a mains switch 46. The mains switch 46 is located on the right hand side of the base unit housing 42. Cooling slots 47 for the power supply unit (102, Figure 4) are provided in the upper surface of the raised portion 44. Further slots 48 in the upper surface of the base unit housing 42 are located over a speaker (110, Figure 4) for relaying information to the user of the data entry system. The rear of the housing 42 is also provided with a socket 52 for a standard telephone plug for connecting the base unit 40 to a telephone line 50 and a standard serial connector 54 for connecting the base unit to, for example, a personal computer (not shown). It will be appreciated that a parallel connector could be provided instead of, or in addition to, the serial connector 54.

Towards the front of the base unit housing 42, a recess is formed which is configured as a cradle 56 for receiving the pen 10.

An optical receiver 62 and an optical transmitter 64 are located in the bottom of the recess for cooperating with the optical transmitter 32 and optical receiver 34, respectively, when the pen is located in the cradle 56. The optical receiver 62 and the optical transmitter 64 are surrounded by a wall 63 which also forms a shroud

between the optical receiver 62 and the optical transmitter 64. The wall 63 cooperates with the recess 33 in the pen 10 to prevent external light reaching the optical link, and the shroud between the optical receiver 62 and the optical transmitter 64 prevents light from the two optical paths between the pen and the base unit and between the base unit and the pen from interfering with each other. It will be appreciated that alternative configurations are possible, for example the wall could be provided on the pen and the recess on the base unit, although this could mean that the pen was less comfortable to use.

First and second base contacts 60 and 61 are also located in the recess for cooperating with the contacts 30 and 31 on the pen 10 when it is inserted in the cradle 56, thus enabling rechargeable batteries (70, Figure 3) in the pen 10 to be recharged. A locating ridge 58 is formed in the recess for cooperating with the locating groove 36 in the bottom of the pen 10 to enable to pen to be positioned correctly in the cradle 56 such that the optical transmitter/receiver pairs 32/62 and 64/34 and the contact pairs 30/60 and 31/61 are aligned correctly.

On a further raised portion 66, one or two base unit indicator lights are provided. The first base unit indicator light 67 is for indicating the base unit is receiving mains power and is turned on. Optionally, the second base unit indicator light 68 can used to indicate that rechargeable batteries (70, Figure 3) in the pen are being charged.

Figure 3 is a schematic block diagram of the functional elements of the pen 10. A processor 74 is preferably formed by a conventional programmable microprocessor (e.g., an Intel 80C31 12 MHz CMOS microprocessor with two internal clocks), although a special purpose processing unit could alternatively be used. A read only memory (ROM) 76 is connected via a bus 84 to the processor 74 for the storage of control programs and data. A random access memory (RAM) 78 (e.g. a 128K low power static RAM) is connected to the processor via the bus 84. The RAM 78 is used as working storage and for the storage of data captured using the reading head 14. A display interface 80, which connects the display 20 to the bus 84, responds to display instructions from the processor to drive the display in a conventional manner. An optical interface 86 is connected to the bus to convert data to be transmitted into signals for driving the optical transmitter 32, and

converts signals from the optical receiver 34 into data to be passed to the bus 84.

In the present embodiment, other connections are made directly to the processor rather than via the bus. Thus, in the present embodiment, signals relating to data captured by the reader head 14 are passed directly to the processor 74 to be processed.

The manual switch 22 is also connected directly to the processor. In use this switch serves as a "scroll-down" key. The second manual switch 24, which in use serves as a "scroll-up" key, is, however, connected to the processor via a power control module (PCM) 72. This is because the switch 24 also serves as a "power-up" key for turning the pen on or powering it up after it has been powered down. The power control module 72 responds to operation of the key 24 in a powered down state to connect the battery 70 to the processor 74. The power control module 72 also controls the charging of the battery 70 when the contacts 30 and 31 are connected to the corresponding contacts 60 and 61 in the cradle 56 of the base unit 40. The indicator light 67 (e.g., an LED) is connected to the processor 74 to indicate the successful reading of a bar code. The indicator light 68 (e.g., an LED) is connected to the power control module 72 to indicate when the battery is being charged.

The processor is programmed by means of control programs and data stored in the ROM 76 and, in use, in the RAM 78, to receive signals from the reading head 14, to interpret those signals and to derive data therefrom which are displayed on the display 20 and stored in the RAM 78 for subsequent transmission via the optical interface as will be described in more detail below.

Figure 4 is a schematic block diagram of the functional elements of the base unit 40 of Figure 2. A power supply module 102 is connected to a mains supply via the switch 46 and the supply cable 45. The power supply unit 102 is also connected to the contacts 60 and 61 so that, when the pen 10 is located in the cradle 56, the battery 70 can be recharged. The power supply unit 102 also supplies power to the other elements of the base unit via supply lines which are represented schematically (for reasons of drawing simplicity) by the arrows 104.

A modem 100 is connected via an optical link 106 to an optical receiver 62 and an optical transmitter 64. The optical interface 106

converts signals from the optical receiver 62 to data to be passed to the modem 100 and converts data from the modem 100 to signals to be transmitted by the optical transmitter 64. A further interface (e.g. a standard V24/RS232 interface - not shown) for connection to a personal computer (not shown) could also be provided. The modem 100 can be a conventional modem generally comprising a master control unit 112, a data pump 114 and memory 118. The master control unit 112 is connected to receive data from the optical interface 106 (and/or from a V24/RS232 interface, if a personal computer is connected). Data from the data pump 114 are coupled via a line interface 116 to the telephone line 50. The data pump 116 is also connected via an audio interface 120 to a speaker 110 for monitoring the transmission of data via the telephone line 50.

Figure 5 is a schematic representation of a data entry network comprising a plurality of pens/base units 10/40 connected via respective telephone lines 50 to a processing centre 108 where data transmitted from the individual pens/base units 10/40 are processed. In the preferred embodiment of the invention, the pens/base units 10/40 are used for the placing of orders for merchandise and the processing centre 108 processes those orders and dispatches them to the users.

Figure 6 is a schematic representation of a control card for use with the pen 10. The card shows bar codes for the numerals 0 to 9 and for a set of commands. The command bar codes are used for controlling the operation of the pen 10.

At this point it should be explained that the operation of reading a bar code is performed by the processor 74 in a conventional manner. Thus, where the head 14 comprises a red or infra-red light source and a light sensor, signals representing changing levels of reflected illuminations are supplied to the processor 74. Firmware stored in the ROM 76, or in other embodiments possibly hard-wired in the processor 74, is used then to decode the changing levels of reflected illumination to generate a numerical value. On successful reading of a bar code the good read light 26 is illuminated.

The processor tests the numerical values to determine whether the sensed code relates to data or a command. A look up table containing the numerical values for individual commands (not shown) is configured in the ROM 76 and/or RAM 78. By accessing this table, input commands

can be identified. The controlling software is aware of which commands can be executed for the current processing state. On identifying a currently executable command, the processor 74 executes that command and causes the display of a human readable command description for user verification purposes. The processor causes an error message to be displayed on the display screen if a non-executable command (e.g., a command has been input at a wrong time) has been input.

If the code does not relate to a recognised command, it is treated as data. The data are then stored in RAM as the result of reading a bar code or possibly used to address a description of the item referenced by the bar code value from a further look-up table. If a description of the item corresponding to the bar code value is stored in the ROM 76 and/or the RAM 78 in a suitable data structure so that the bar code value can be used either directly or indirectly to address the appropriate description, then the item description can readily be displayed instead of or as well as the bar code value for user verification purposes.

If the bar code is not read correctly, then an error message is displayed on the display screen.

Figure 7 is a flow diagram illustrating an example of a series of operations using the data entry system described with reference to Figures 1 to 6.

In a first step, S1, the pen 10 is removed from the base unit 40.

In step S2, "Up" key switch 24 is operated. The power control module senses operation of this key switch and powers up the processor 74, which performs a series of diagnostic checks, calibrates itself and then displays an initial message (e.g., "Ready") on the display 20.

In step S3 the "Down" and "Up" scroll keys switches 22 and 24 are operated to scroll though a number of initial options pre-stored within the ROM 76 or the RAM 78 and presented on successive screens of data items on the display 20.

In this example of operation, in step S4, when an option "Left-handed operation" is encountered on the screen, the pen is scanned over the "Enter" command bar code on the command sheet of Figure 6. Whereas for right-handed operation, where text is displayed in English, the text is displayed in sequence from the end of the display nearest to the reading head 14 towards the opposite end, for left-handed operation

the text display is inverted with the text then reading from the end of the display furthest from the reading head to the end nearest thereto. It can be seen, therefore, that the text is displayed in an orientation appropriate for the user. If left-handed operation has already selected and it is desired to use the pen in a right-handed mode, then "Right-handed operation" can be selected by scrolling the display using the "Down" and "Up" key switches 22 and 24 and then scanning the "Enter" command bar code when the appropriate option is displayed.

Other options which could be provided in this manner could, for example, be the selected of one of a number of operating languages.

In step S5, the scroll key switches 22 and 24 are again operated until the option "Ready" is encountered once more. Then a series of merchandise selections can be entered by the user by scanning the bar codes for the desired merchandise selections and the command bar codes "Enter", "Clear", "Quantity", etc., as appropriate. As each bar code is scanned successfully, the good read indicator 67 lights and the data read by the bar code reader is displayed on the screen. Either the alphanumeric value of the bar code read is displayed or, if a description of the item corresponding to the bar code value is stored in the RAM or the ROM, then this can be displayed instead of or as well as the bar code value.

Step S5 can be repeated as often as desired until all the desired items have been entered, or until the RAM 78 has become full or nearly full, in which case a "Memory full" error message is displayed on the display screen 20.

If desired, the items entered and stored in the RAM 78 could be checked by selecting a "Check Entries" option with the scroll key switches 22 and 24 and scanning the "Enter" bar code. In this case the items entered can then be checked in sequence using the scroll key switches 22 and 24, and if necessary corrected by scanning the correct command bar code while the appropriate item is displayed. When all the entries have been checked, the "Enter" command bar code is then scanned again.

In the example shown in Figure 6, however, after entering the desired items, a phone number is then entered in step S6 by scanning the command bar code "Phone" followed by the number of the processing centre 108 to be called. As an alternative to entering separately the

telephone number, this could be pre-stored in memory, or could alternatively be included in the "Phone" bar code.

After this, in step S7 the pen is placed in the cradle on the base unit and the "Down" key switch 22 is pressed to download the data from the pen. This causes the data for the telephone number to be downloaded to the modem 100 via the optical link 106. The downloading of the telephone number causes the base unit automatically to call the desired number and, once the normal modem handshaking is completed, to transfer the data stored in the RAM 78 in the pen 10. Preferably, in addition to the actual data stored, the processor 74 in the pen 10 automatically adds error correcting codes to enable the processing centre 108 to verify that successful transmission has occurred. The processing centre 108 then sends a message to confirm (or otherwise) whether successful transmission occurred after checking the error correcting codes. This message is then displayed on the display 20 of the pen 10.

In a final step (not shown in Figure 7), the pen is turned off by pressing the "Down" and "Up" scroll key switches simultaneously. It should be noted that the processor, which is provided with a date and time clock, is arranged to power-down the pen to conserve battery power if no bar codes are scanned and no key switches operated during a predetermined interval (e.g. 30 seconds).

The software stored in the pen also permits the loading of programming data from the processing centre or another remote computer. The programming is performed using a series of commands preceded by dot codes. The programming commands are thus known as "dot" commands and cover operations such as RAM PEEK, RAM POKE, ROM PEEK, DISPLAY, SENSE, GET INFO, GET FIRST ITEM, GET NEXT ITEM, GET PREVIOUS ITEM, AMEND ITEM, DELETE ITEM, CLEAR ORDER, CLEAR CATALOGUE, ADD CATALOGUE ITEM, and AMEND CATALOGUE ITEM. In this way, a significant amount of software can be held in the processing centre and be sent to the pens only when required.

The processing centre can also send commands to a hand held unit to instruct the user to scan in a personal identification number (PIN), possibly with the scanning of a further verification number from, for example a verification device in the form of a verification card (e.g., a credit, payment or other validation card) or like carrier carrying a

verification bar code and/or dot code for verification of a user identity. Operation of the data entry system subsequent to an initial data capture operation can then be made dependent on the identification of authorised coded data and a PIN number.

Figure 8 illustrates another example of a pen 10 in accordance with the invention. This example is substantially the same as the pen 10 described with reference to Figures 1 and 3, apart from the addition of a touch sensitive screen 90 for the display 20. A touch screen interface 88 couples the touch sensitive screen to the bus 84 so that data sensed by the touch sensitive screen can be communicated to the processor 74. Although Figure 8 shows a touch sensitive screen 90 (e.g., an overlay) separate from a conventional display screen, any applicable touch sensitive screen technology can be used, either though the use of an addition to an existing conventional display screen, or the use of a display screen with integral touch sensitivity. One or more touch sensitive areas can be defined on the touch sensitive screen area, in combination with the data displayed on the display screen, for the entry of commands and/or the selection of displayed items. In particular, the processor 74 can be arranged to display a menu of user selectable items and to be responsive to a location at which the screen is touched for input of a user selection of a menu item. The touch sensitive screen can then thus be used as a dynamic and reconfigurable user interface. Touch screen entry can be used in place of or in addition to the entry of commands by scanning the bar codes on the command bar code card.

Figure 9 illustrates another example of a pen 10 in accordance with the invention. This example includes much in common with the pen 10 of Figure 3, except that here a modem 92, a socket 94 for a standard telephone plug and a speaker 95 for monitoring transmissions during operation of the modem are provided in place of the optical interface 86 and optical transmitter and receivers 32 and 34. In this example, therefore, data can be transmitted and received via a telephone line without the use of the base station, providing added portability. Preferably, a simplified base station is provided in the form of a charging unit for rechargeable batteries in the pen 10. It will be appreciated that the pen 10 could also be provided with the touch screen facility of the pen 10 of Figure 8.

Although in the above embodiments, the pens 10 are intended for manual scanning of bar codes, it will be appreciated that they could also be used for reading other optically readable codes, such as binary dot codes, by the provision of appropriate control software for programming the processor 74. Alternatively, in place of the sensor head 14 which is intended to be manually scanned, a self scanning head could be provided.

The invention is also applicable to the reading of other coded data sources such as, for example, magnetic strips, by the provision of an appropriate reading head and control logic.

More generally, the invention also includes the provision of a data entry pen with a reading head which is responsive to movement of the pen for tracing out desired codes and or commands. In particular, by the provision of a rolling ball in a holder in the reading head, of rotation sensing means in the manner of a personal computer mouse for tracing movements of the ball and suitable interpretation logic in software or special purpose hardware, for defining a series of vectors as the pen is moved over a surface and for performing pattern recognition on the resulting vector patterns to identify control and/or alphanumeric characters traced out by the pen head, it is possible directly to input information into the pen by "writing" down those characters. By limiting the range of characters to be recognised (e.g., corresponding to the numerals and commands shown in Figure 6) it is possible to use conventional pattern recognition techniques with relatively limited processing power and storage requirements. It will be appreciated that increased processing power and storage can be provided in the pen described above for the embodiments of Figures 1, 3, 8 and 9 by the use of a more powerful processor and increased memory capacity.

Although specific embodiments of the invention have been described hereinabove, it will be appreciated that many modifications and/or additions are possible within the scope of the present invention.

For example, although in the examples of the pen and base unit described with reference to Figure 1 to 4 and 8 an optical link between the pen and the base unit is provided, in an alternative embodiment other wireless data transmission means, for example radio signals,

could be used, in the manner of a portable telephone of the type with a portable handset and a base unit. Also, in the case of the pen 10 without a base station for the modem, the pen could be provided with cellular phone technology rather than a socket for a telephone plug so that data could be downloaded via a telephony link without needing to be connected to a physical telephone cable.

The data from the memory of the pen could conveniently be downloaded in alphanumeric form via the modem to a facsimile (fax) machine for printing the content of the memory.

Although no speaker is illustrated in the examples of the pen described with reference to Figures 3 and 8, a speaker or other sound generator could be provided for giving audio feedback to report on the correct reading, or otherwise, of a code. Thus, for example, when a code is correctly read, one beep can be sounded, and when a code is incorrectly read, two beeps could be sounded.

Although in the examples described above the plane of the display in generally parallel to the axis of the pen, the plane of the display 20 could be arranged to slope progressively towards the axis of the pen away from the head end of the pen to reduce the angle between the normal to the plane of the display and the line of sight of the user.

Also, although in the present examples two mechanical key switches are provided, in other embodiments one key switch only could be provided. Operating that key switch a predetermined number of times within a short period could be used to emulate the provision of two key switches for scrolling and other functions. More key switches could also be provided in other embodiments, although, in view of the aims of the invention, it is desirable that a low number of keys is used. As in the embodiments described above, two key switches are preferred.

Although in the example of a card or other carrier shown in Figure 6 a set of bar codes for only numeric and command codes are indicated, if desired a set of bar codes for the complete alphabet could be provided. Alternative arrangements of the codes would also be possible, for example a complete set of codes and corresponding characters could be arranged in the format of a standard typewriter keyboard layout. The codes could also be incorporated in the letters and numerals, for example extending as a strip across the letters and numerals. For example, a bar code could replace the cross bar in a

capital "A", and similar modifications for the other letters of the alphabet.

In a merchandising system, where bar codes or other codes are associated with merchandisable items, this could be achieved simply by means of a printed catalogue, or some other form of list, or as a result of codes applied to examples of the products in question, or as a result of codes displayed, for example, on a TV screen with images relating to those products. The only requirement is that the display of the codes are readable by the data entry system of the present invention.

CLAIMS

1. A data entry system comprising an elongate hand held data entry unit for capturing data, wherein said hand held unit is configured such that it may be held by a user in the manner of a pen or quill and wherein said hand held unit comprises:

a reading head at or adjacent one end of said hand held unit, said reading head comprising a reading sensor for sensing commands for controlling said hand held unit and data to be entered, said sensor producing input signals in response to said sensed commands and data;

processing means connected to receive and process said input signals from said sensor for decoding and responding to said commands and for generating captured data;

storage means receiving said captured data from said processing means for storing said captured data; and

a display screen for displaying said commands and/or data including a user-readable representation thereof.

2. A data entry system according to claim 1 comprises one or two manually operable switches for scrolling said display in a first and/or second direction for selectively displaying a plurality of data stored in said storage.

3. A data entry system according to claim 2, wherein said first and/or second switches are the only switches on said hand held unit.

4. A data entry system according to claim 2 or 3, wherein operation of said first and/or second switches in predetermined operational states of said hand held unit causes predetermined functions other than scrolling functions to be performed.

5. A data entry system according to any one of the preceding claims, wherein said display comprises a touch sensitive screen, said processing means being arranged to display a menu of user selectable items and to be responsive to a location at which said screen is touched for input of a user selection of a said menu item.

6. A data entry system according to any one of the preceding claims comprising a sensor for reading coded data, wherein said processing circuitry determines natural language characters corresponding to said coded data as said captured data for storage and/or display.

7. A data entry system according to claim 6, wherein said coded data comprises bar codes and/or binary dot codes and said sensor is a bar code and/or dot code reader.

8. A data entry system according to any one of claims 1 to 5 wherein said reading head comprises a reading sensor for tracing movements of said reading head, wherein said processing means is responsive to signals from said sensor representative of said movements for identifying command or data characters traced by said reading head as said captured data.

9. A data entry system according to any one of the preceding claims, wherein said processing means is user programmable to cause said captured data to be displayed on said display either in a first orientation suitable for reading displayed data when said hand held unit is held in a user's right hand, or in a second orientation suitable for reading displayed data when said hand held unit is held in a user's left hand.

10. A data entry system according to any one of the preceding claims wherein said display has a substantially rectangular display screen with a longitudinal axis arranged substantially parallel to a longitudinal axis of said hand held unit.

11. A data entry system according to any one of the preceding claims comprising, in said hand held unit, a telecommunications interface which includes a modem unit connected to said storage for receiving said captured data and means for connecting said modem to a remote processing centre, whereby said modem is operable in use to receive said captured data from said storage for telephonic transmission of said captured data to said processing centre.

12. A data entry system according to any one of claims 1 to 10 comprising a base unit separate from said hand held unit, wherein said base unit and said hand held unit are provided with a wireless data link which is operable for transferring data from said hand held unit to said base unit and/or from said base unit to said hand held unit.

13. A data entry system according to claim 12 comprising, in said base unit, a telecommunications interface which includes a modem connectable to said storage via said data link for receiving said captured data and means for connecting said modem to a remote processing centre, whereby said modem is operable in use to receive said captured data from said storage via said data link for telephonic transmission of said captured data to said processing centre.

14. A data entry system according to any one of the preceding claims comprising a base unit separate from said hand held unit, wherein said base unit is configured to define a rest position for said hand held unit and said base unit and said hand held unit are provided with a data link which is operable for transferring data from said hand held unit to said base unit and/or from said base unit to said hand held unit.

15. A data entry system according to claim 14, wherein said base unit and said hand held unit are each provided with optical transmitters and/or receivers which cooperate when said hand held unit is in said rest position to provide a two way optical data link for transferring data from said hand held unit to said base unit and/or from said base unit to said hand held unit.

16. A data entry system according to claim 14 or claim 15 wherein said hand held unit comprises a rechargeable power source, said base unit comprises a charger unit, and said base unit and said hand held unit are each provided with electrical connectors which can be interconnected to enable recharging of said rechargeable power source.

17. A data entry system according to any one of claims 1 to 16 comprising:

- means for displaying a plurality of selectable items with associated data sources for user selection of an item by operation of said hand held unit; and
- a remote processing centre for processing user selections transmitted from said hand held unit.

18. A data entry system where said hand held unit is programmable remotely from said processing centre.

19. A merchandising system comprising a data entry system according to claim 17 or claim 18, wherein:
- said selectable items are merchandisable items; and
- said remote processing centre initiates processing of user orders of said selectable merchandisable items.

20. A data entry system according to any one of claims 1 to 18 or a merchandising system according to claim 19 comprising a verification device in the form of a verification card or like carrier carrying a verification bar code and/or dot code for verification of a user identity.

21. A card or like carrier carrying a verification bar code and/or dot code suitable for verification of an identity of a user of a data entry system or merchandising system according to claim 20.

22. A carrier for a plurality of data and/or command codes for association with means for displaying a plurality of selectable items in a data entry system according to claim 17 or 18 or a merchandising system according to claim 19, wherein said carrier carries a plurality of codes, each for a respective one of a plurality of natural language and/or numeric characters and a plurality of commands for controlling the operation of said data entry or merchandising system, each code being associated with a visual representation of the corresponding natural language or numeric character or command.

23. A carrier according to claim 22 wherein said codes are bar and/or dot codes.

[illegible] ract

ABSTRACT

DATA ENTRY SYSTEMS

A data entry system includes a pen-like hand held data entry unit for capturing data with a sensor head at or adjacent one end thereof for sensing input data and producing data signals, a processor for generating captured data in response thereto, storage for the captured data, and a display screen for displaying data including a user-readable representation of the captured data with a scrolling facility for scrolling said display for selectively displaying a plurality of data stored in storage. Preferably the pen only includes two keys for scrolling and other functions, further data and commands being entered via the sensor head (e.g., by scanning bar codes or the like). Optionally, a touch sensitive display screen is provided. In one embodiment, the sensor head traces its movements and the processor is responsive to this to identify characters and commands traced out by the sensor head as a means for the entry of data and commands. A base unit separate from the hand held unit may be provided, the base unit being configured to define a rest position for the hand held unit and the base unit and the hand held unit being provided with a data link. Data can also be transmitted to a remote processing centre by means of a modem or the like provided in the hand held unit or the base unit.

[Figure 1]

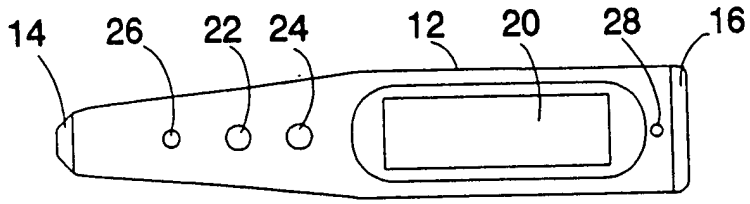


FIG. 1A

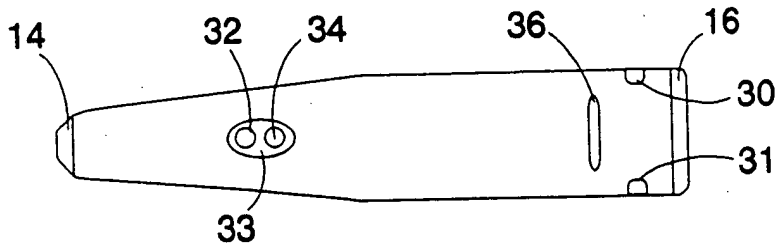


FIG. 1B

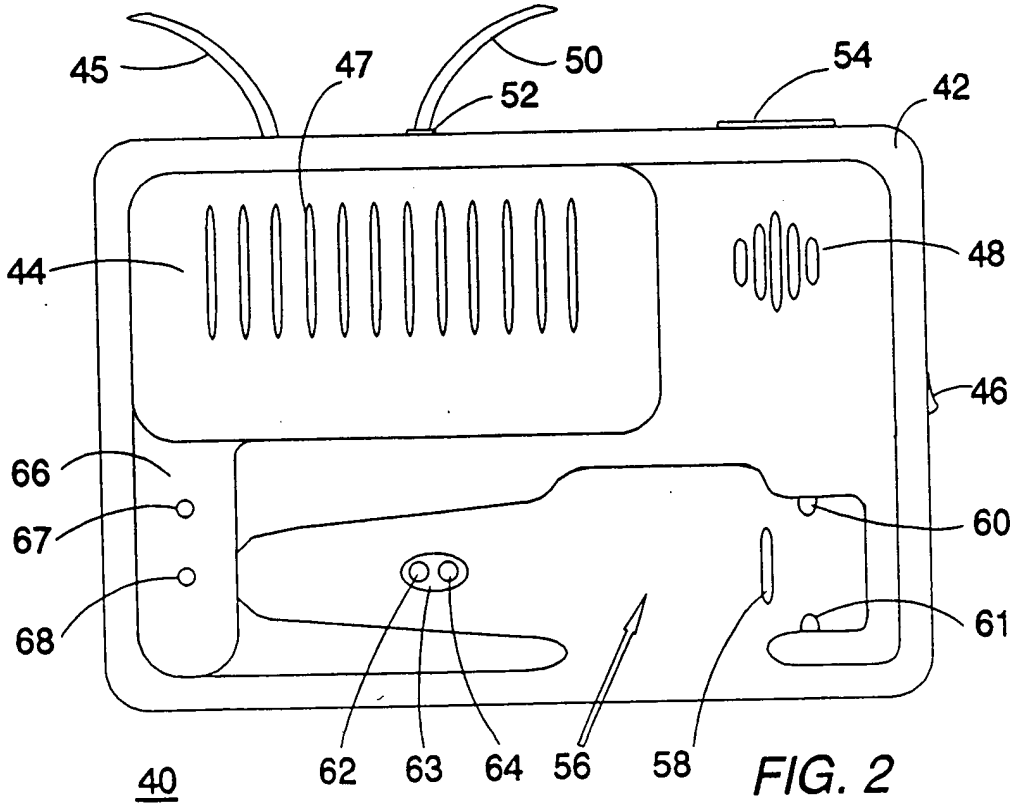


FIG. 2

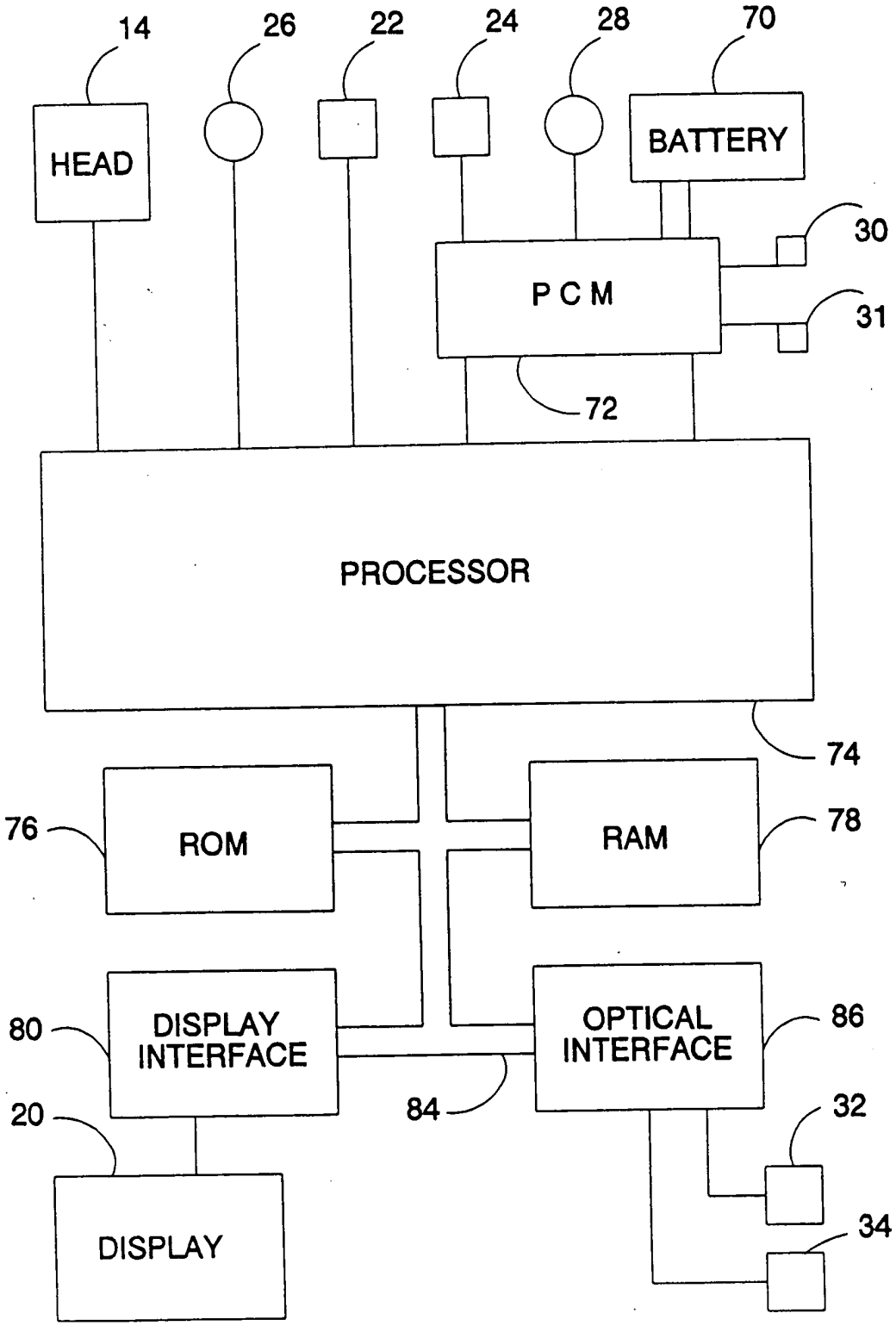

14
26
22
24
28
70
HEAD
BATTERY
30
P C M
31
72
PROCESSOR
74
76
ROM
RAM
78
80
DISPLAY INTERFACE
OPTICAL INTERFACE
86
84
20
32
DISPLAY
34

FIG. 3

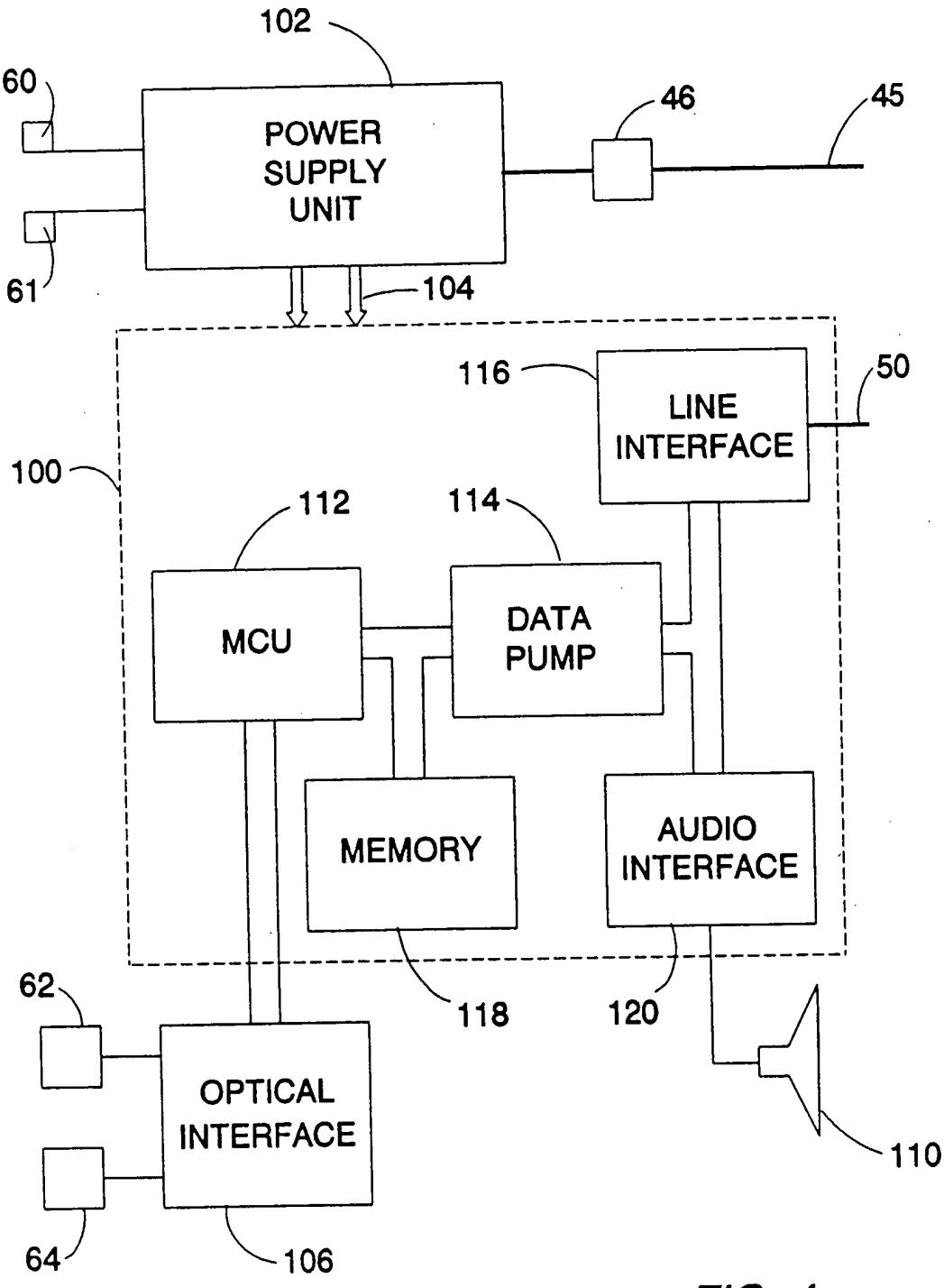

102
60
POWER SUPPLY UNIT
46
45
61
104
116
LINE INTERFACE
50
100
112
114
MCU
DATA PUMP
MEMORY
AUDIO INTERFACE
62
118
120
OPTICAL INTERFACE
110
64
106

FIG. 4

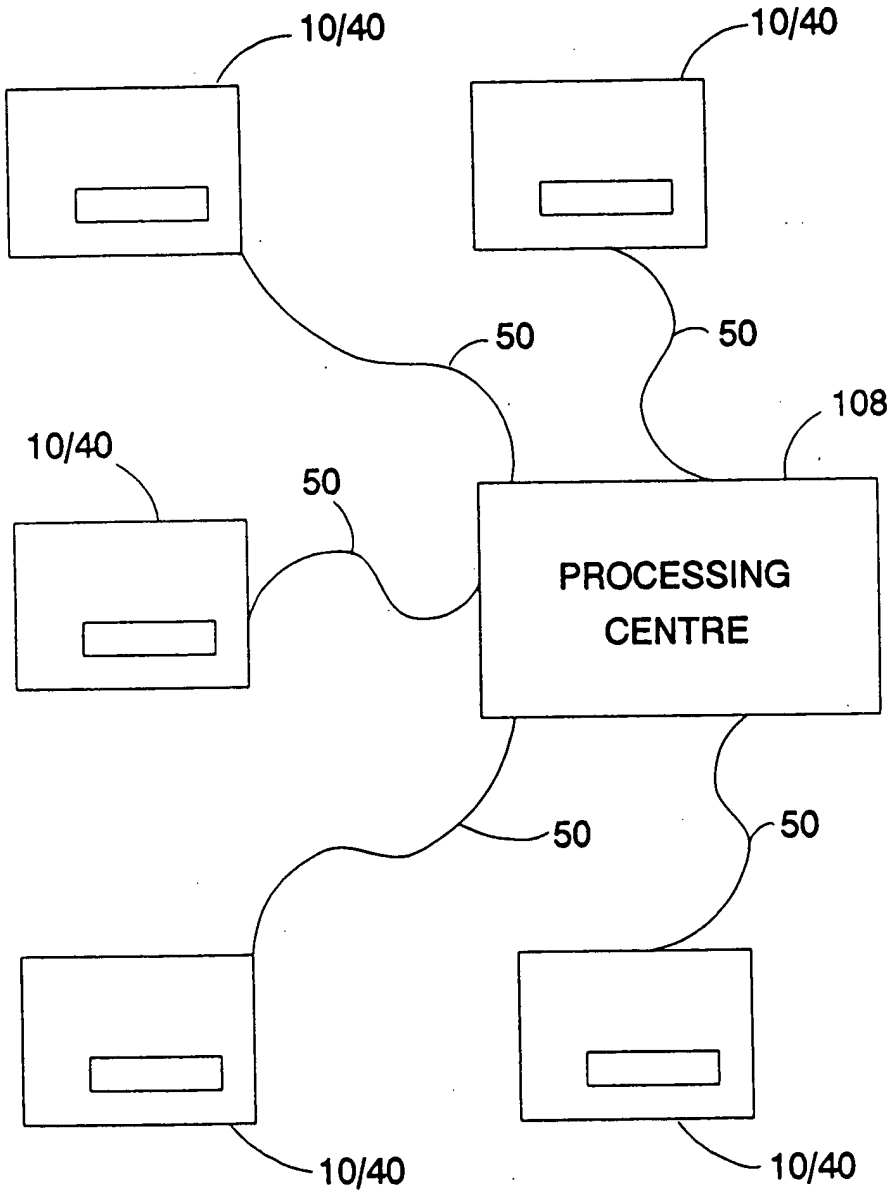
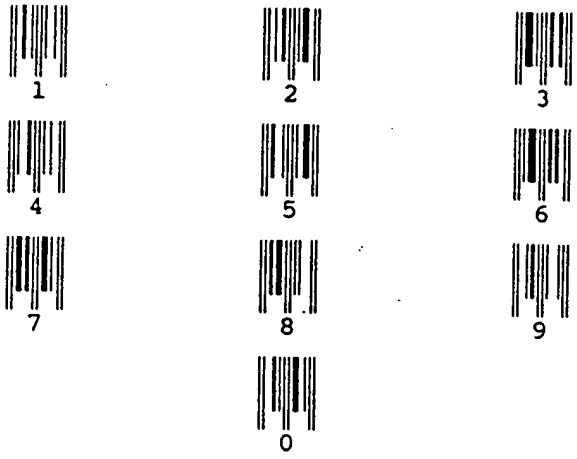


FIG. 5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2
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8
9
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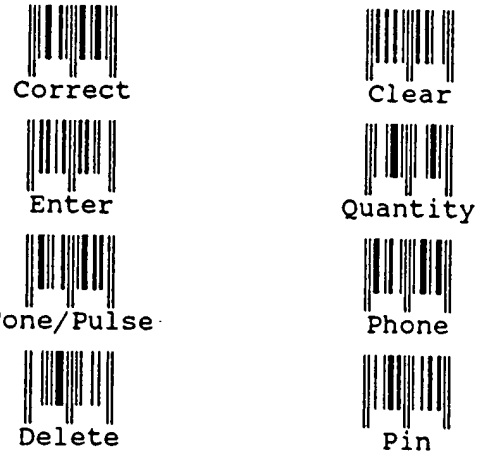
Correct
Clear
Enter
Quantity
Tone/Pulse
Phone
Delete
Pin

FIG. 6

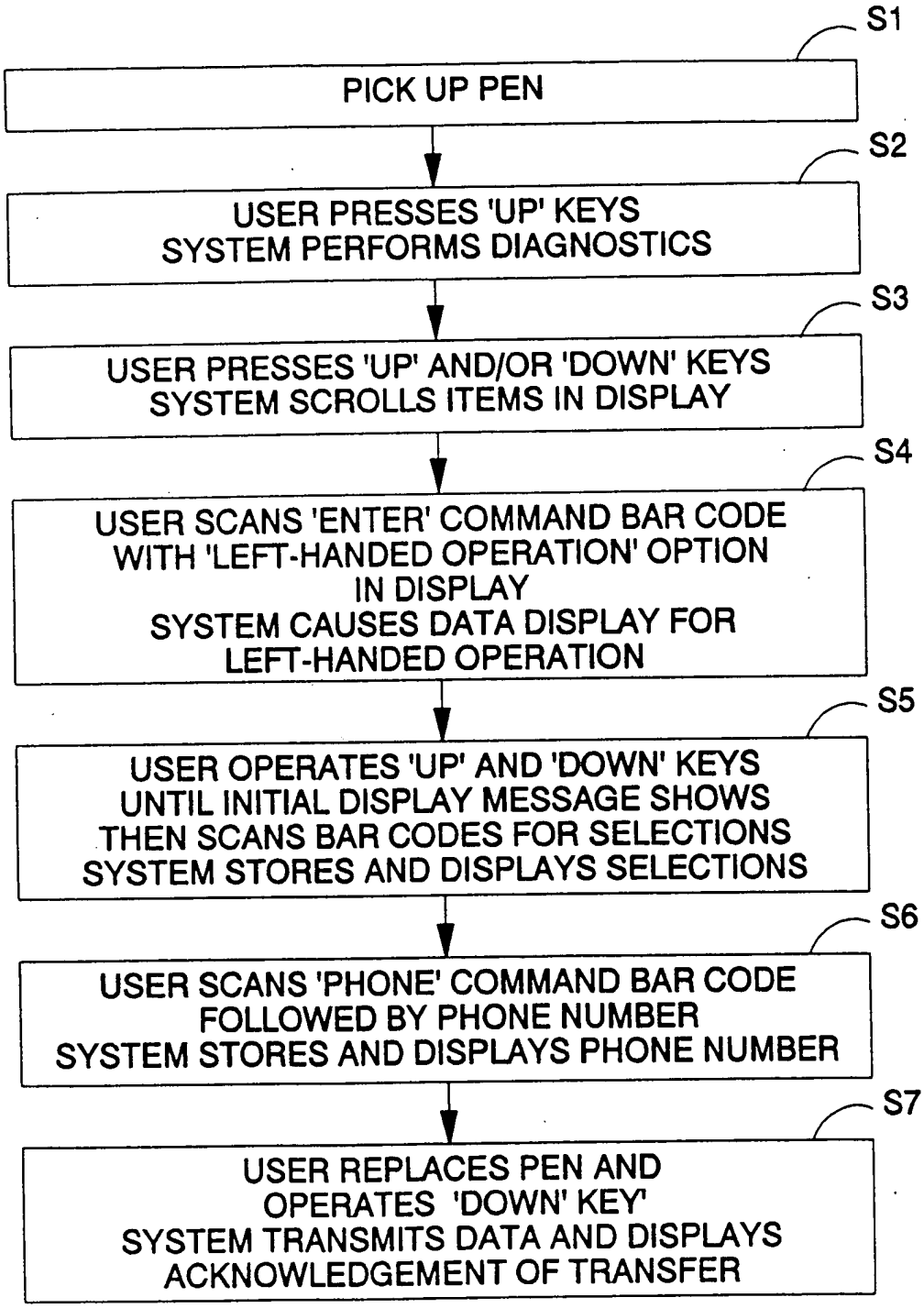
S1
PICK UP PEN
S2
USER PRESSES 'UP' KEYS
SYSTEM PERFORMS DIAGNOSTICS
S3
USER PRESSES 'UP' AND/OR 'DOWN' KEYS
SYSTEM SCROLLS ITEMS IN DISPLAY
S4
USER SCANS 'ENTER' COMMAND BAR CODE
WITH 'LEFT-HANDED OPERATION' OPTION
IN DISPLAY
SYSTEM CAUSES DATA DISPLAY FOR
LEFT-HANDED OPERATION
S5
USER OPERATES 'UP' AND 'DOWN' KEYS
UNTIL INITIAL DISPLAY MESSAGE SHOWS
THEN SCANS BAR CODES FOR SELECTIONS
SYSTEM STORES AND DISPLAYS SELECTIONS
S6
USER SCANS 'PHONE' COMMAND BAR CODE
FOLLOWED BY PHONE NUMBER
SYSTEM STORES AND DISPLAYS PHONE NUMBER
S7
USER REPLACES PEN AND
OPERATES 'DOWN' KEY'
SYSTEM TRANSMITS DATA AND DISPLAYS
ACKNOWLEDGEMENT OF TRANSFER

FIG. 7

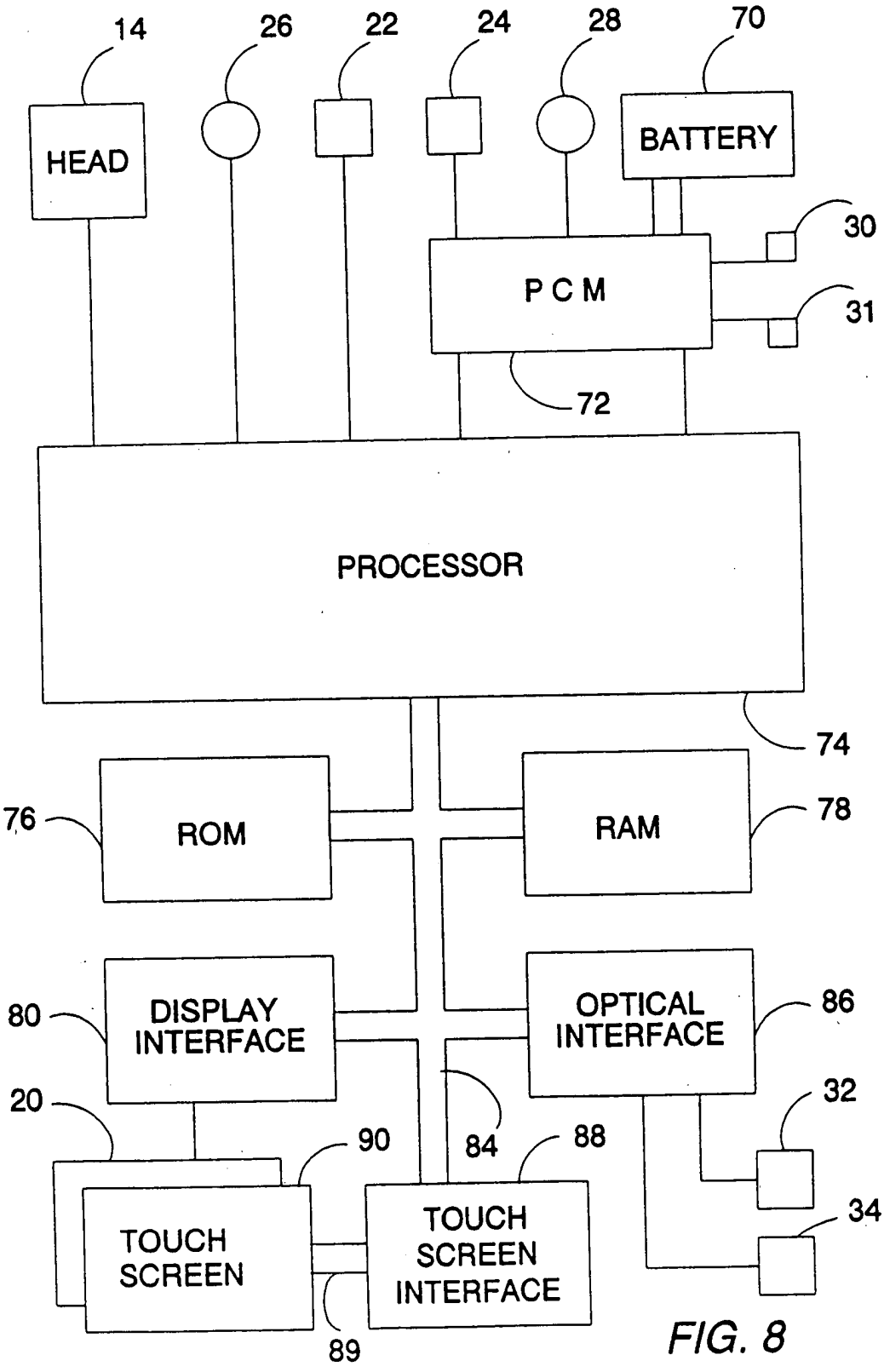
14
26
22
24
28
70
HEAD
BATTERY
30
P C M
31
72
PROCESSOR
74
76
ROM
RAM
78
80
DISPLAY INTERFACE
OPTICAL INTERFACE
86
20
32
90
84
88
TOUCH SCREEN
TOUCH SCREEN INTERFACE
34
89

FIG. 8

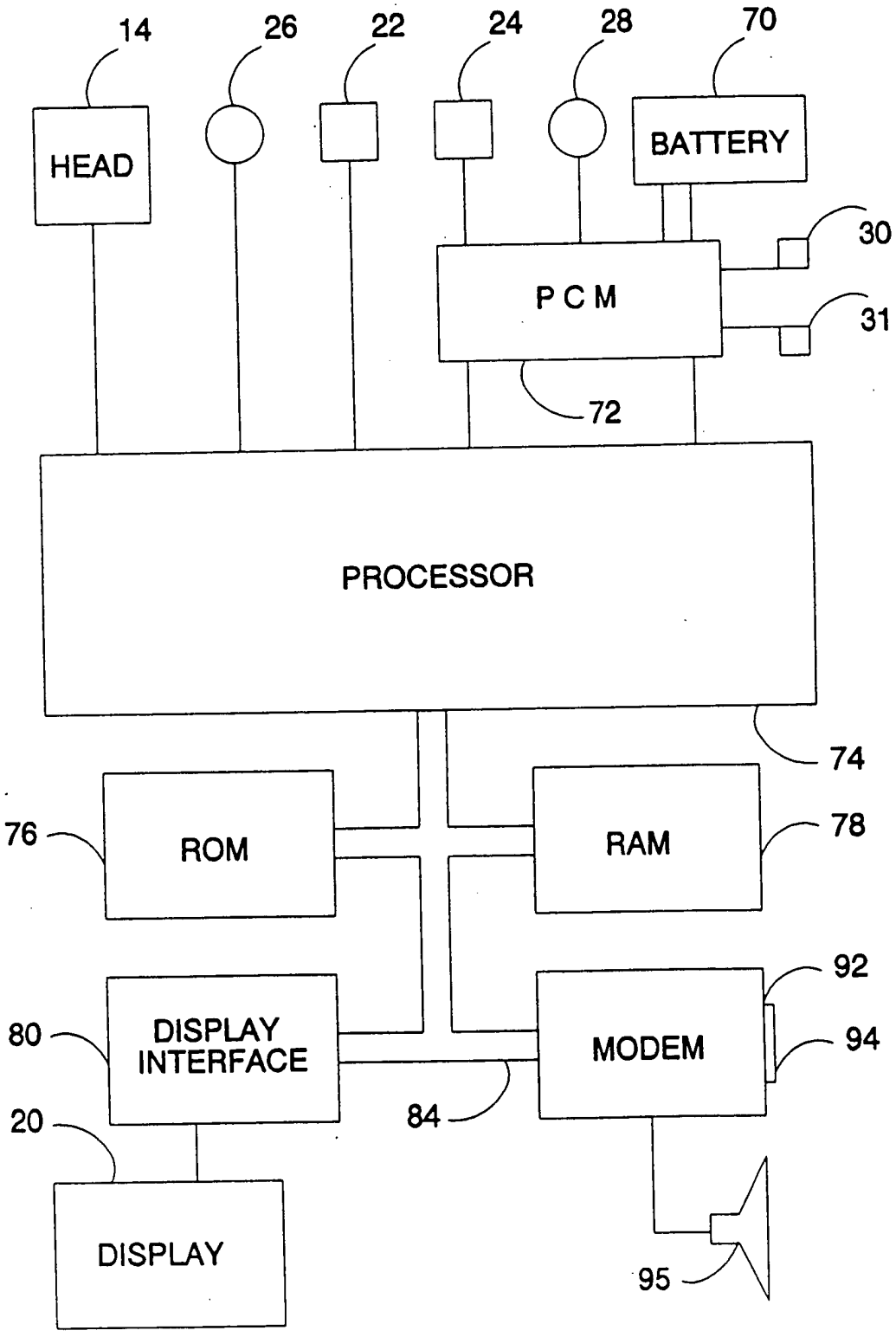
14
26
22
24
28
70
HEAD
BATTERY
30
P C M
31
72
PROCESSOR
74
76
ROM
RAM
78
92
80
DISPLAY INTERFACE
MODEM
94
84
20
DISPLAY
95

FIG. 9